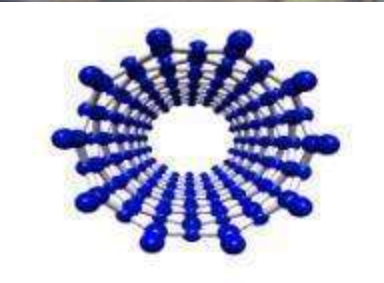


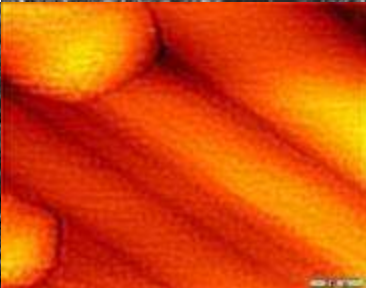
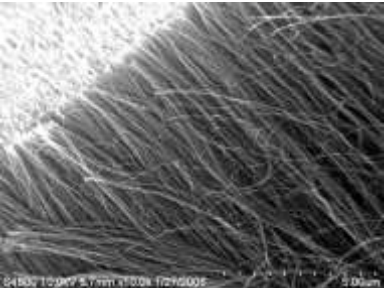
Sealants, Composites,  
EMI shielding

*Locations in  
Yadkinville, NC and  
Kettering, OH*

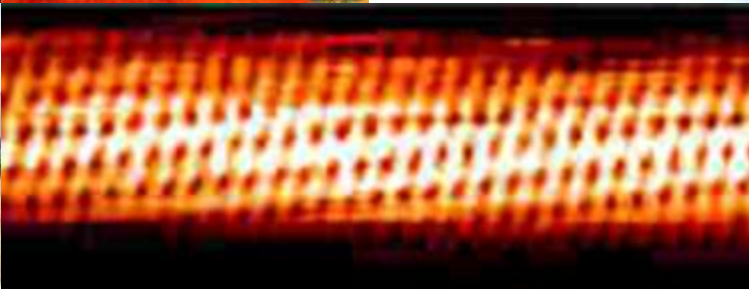


Nanotubes and high  
aspect ratio materials

- Small business
- Veteran Owned



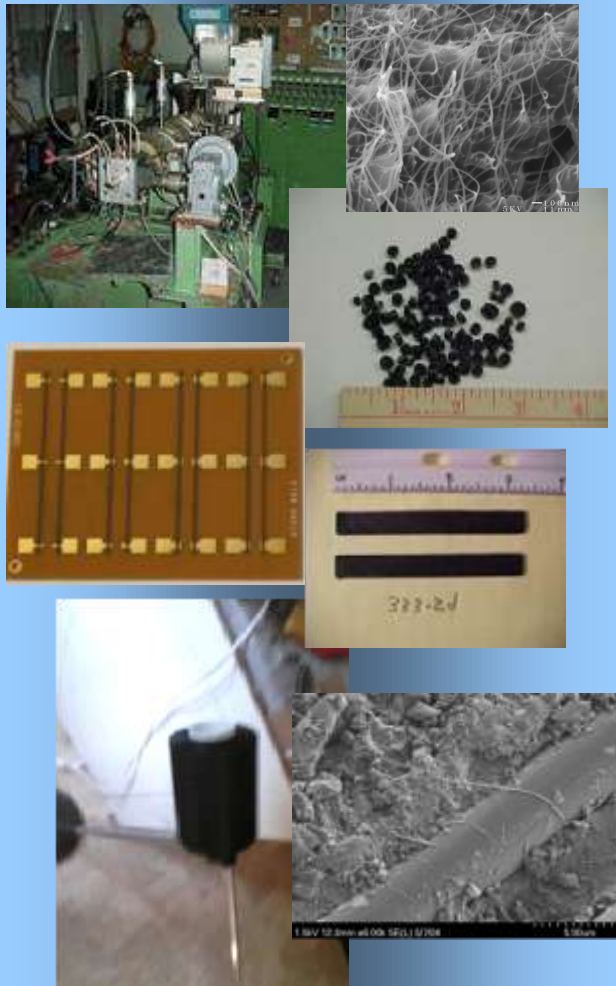
Oil drilling chemicals



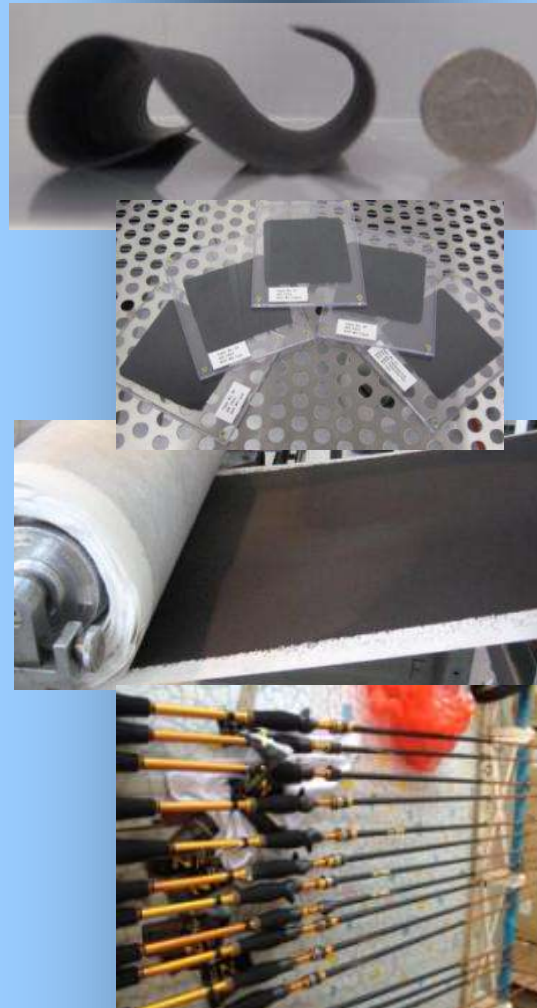


# NTL Nanotechnology

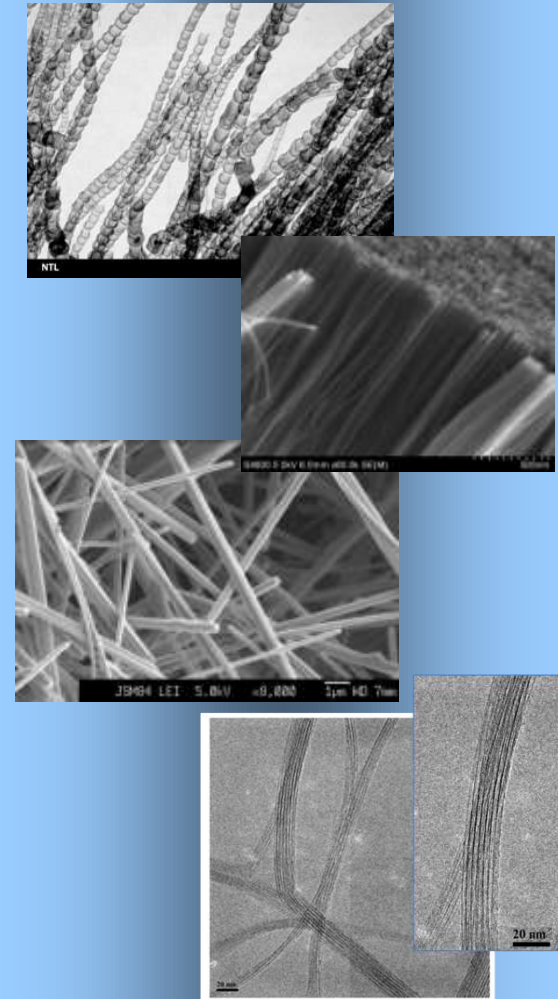
## Nanoplastics



## Buckypaper



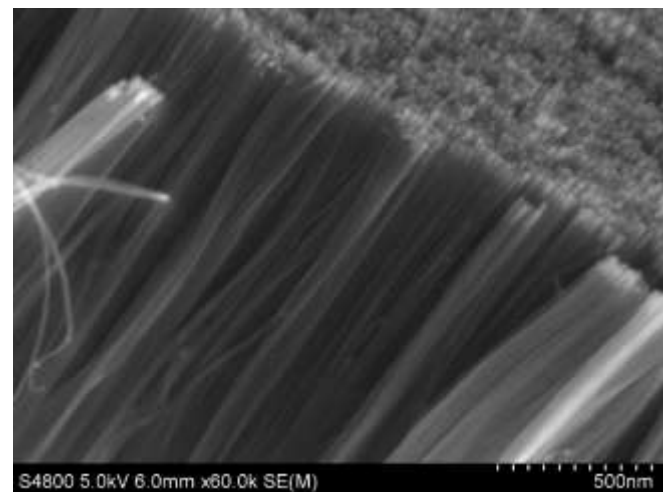
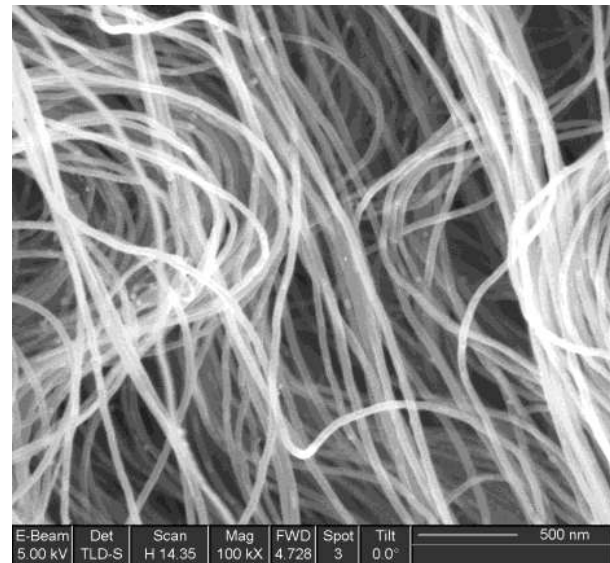
## Custom Nanomaterials





# We make our own nanotubes

- NTL grows high aspect ratio multi-walled carbon nanotubes and at its headquarters in NC
- 10-50 nm in diameter and 5 $\mu$ m to 5mm long depending on the application
- M-grade MWNTs (50nm x 900 $\mu$ m) retail for \$11/gram for bulk production







# We do our own compounding



- Twin screw compounding
- Centrifugal blending
- Solvent blending





# We make our own buckypaper



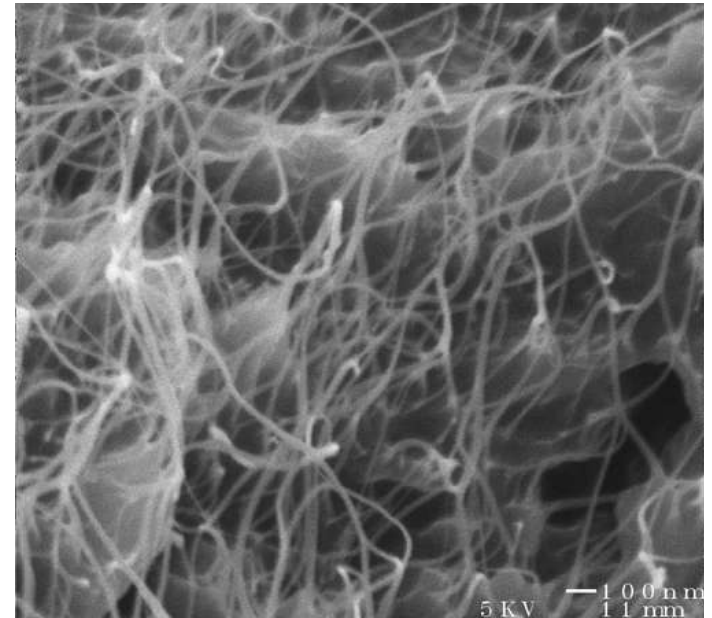


# Nanoplastics

NanoTechLabs is scaling the process to prepare highly conductive nanotube-filled-polymers for EMI shielding and other applications using standard engineering polymers, including: *thermoplastics*, *thermosets* and *elastomers*

## Advantages

- Low loading required for percolation
- Extremely lightweight
- Retains toughness and flexibility of the original polymer
- Fabrication of “metal-free” systems
- Bulk electrical resistance as low as 0.1 ohm-cm



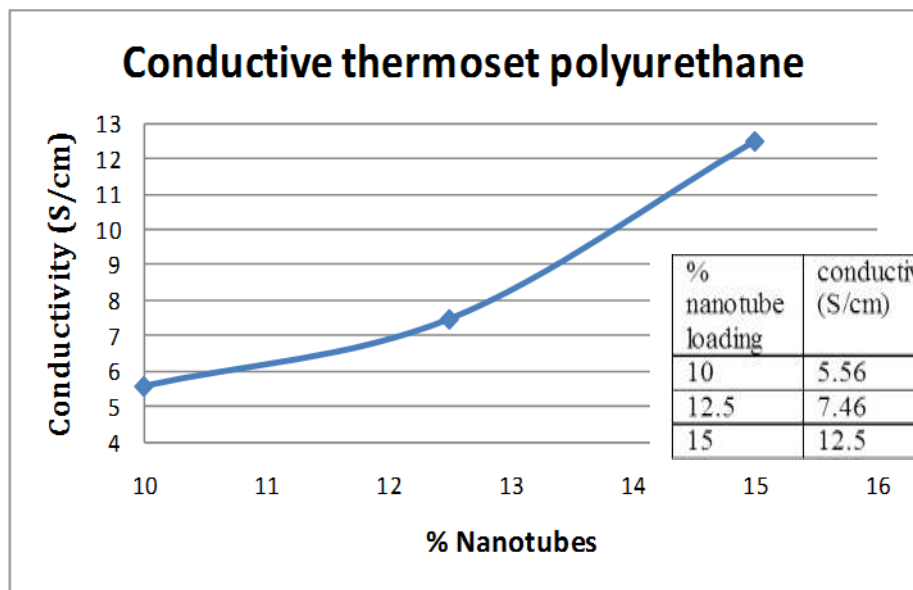
10% CNTs dispersed in polycarbonate

## Potential Applications

- Electromagnetic interference protection
- Electrostatic discharge materials
- Electrostatic paint substrates
- Lightweight thermal management materials
- Conductive gasket (elastomers)



# Polyurethane Data



| SE measurement (dB) |        |        |
|---------------------|--------|--------|
|                     | 0      | 90     |
| Pearlcoat10ST#1     | -85.19 | -91.66 |
| Pearlcoat10SA       | -89.61 | -88.83 |
| Pearlcoat10SB       | -89.39 | -90.9  |

| Delcom ( $\Omega/\text{sq}$ ) |       |            |       |
|-------------------------------|-------|------------|-------|
|                               | 0     | 90 t (mil) |       |
| Pearlcoat10ST#1               | 0.78  | 0.773      | 46    |
| 2-part urethane3              | 0.966 | 0.963      | 40    |
| 2-part urethane2              | 1.04  | 1.05       | 45.45 |
| 2-part urethane1              | 1.122 | 1.1633     | 36.75 |





# Buckeye Composites

*A division of NanoTechLabs, Inc.*

[www.buckeyecomposites.com](http://www.buckeyecomposites.com)

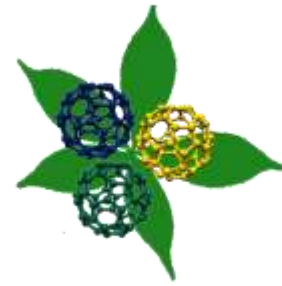
- NTL opened Ohio division **Buckeye Composites** in January 2009
- Located in the National Composite Center
- BuckyShield™ manufacturing and application development
- NTL and NCC have collaborated on buckypaper development and leveraged multiple programs for technology transition







# Carbon Nanomembrane – “Buckypaper”



- **Custom buckypaper development**

- Carbon nanotubes
- Carbon nanofiber
- Nanoscale graphene platelets
- Thickness, areal weight tailorable



- **Continuous production**

- 12” wide
- Up to 345 linear feet
- 0.5 – 2 linear fpm



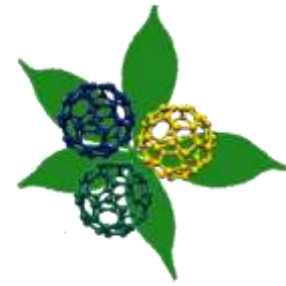
- **Applications**

- EMI Shielding
- Lightning Strike Protection
- Thermal Management

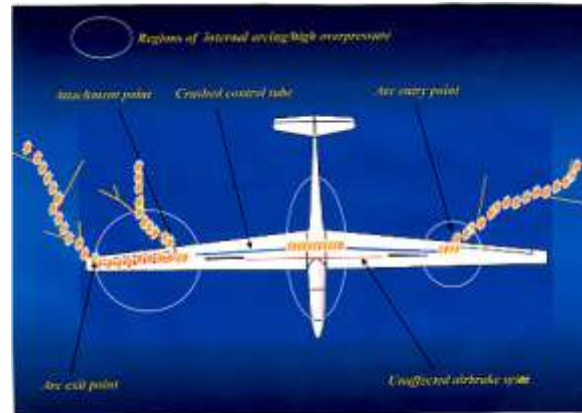




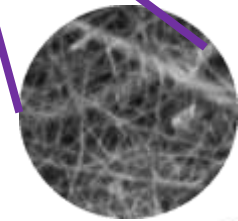
# Eliminate Metallic Shielding for Composite Structures



- Thermal, electrical, and shielding property enhancement
- Reduced Weight
- Improved repairability and manufacturability
- Commercial and aerospace applications
  - Thermal Management
  - EMI Shielding
  - Lightning Strike Protection

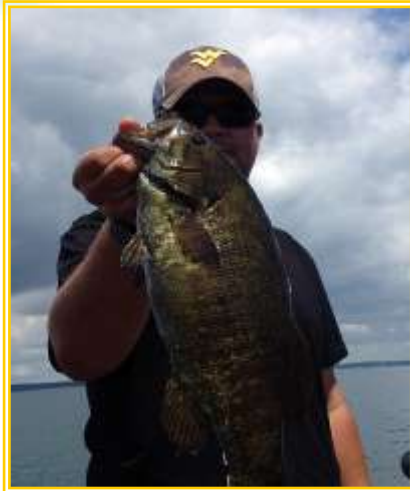


Sketch illustrating regions of arc attachment and arcing within the structure.





# NTSports Venture



ALL CAUGHT ON  
OUR  
**ONYX**  
7' 3" MEDIUM LIGHT  
SPINNING RODS  
ON  
**6 LB. TEST LINE**

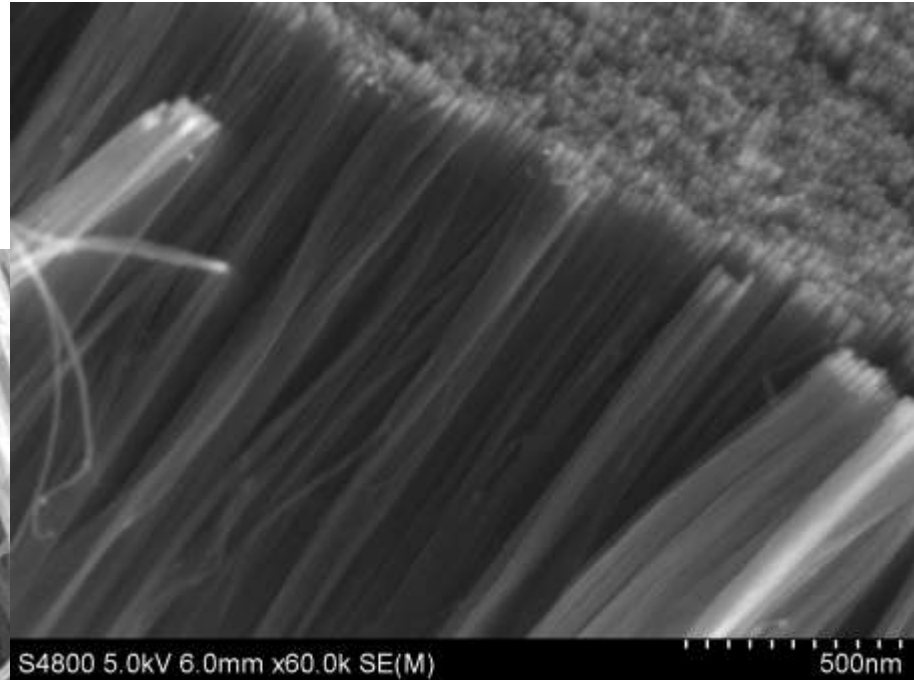
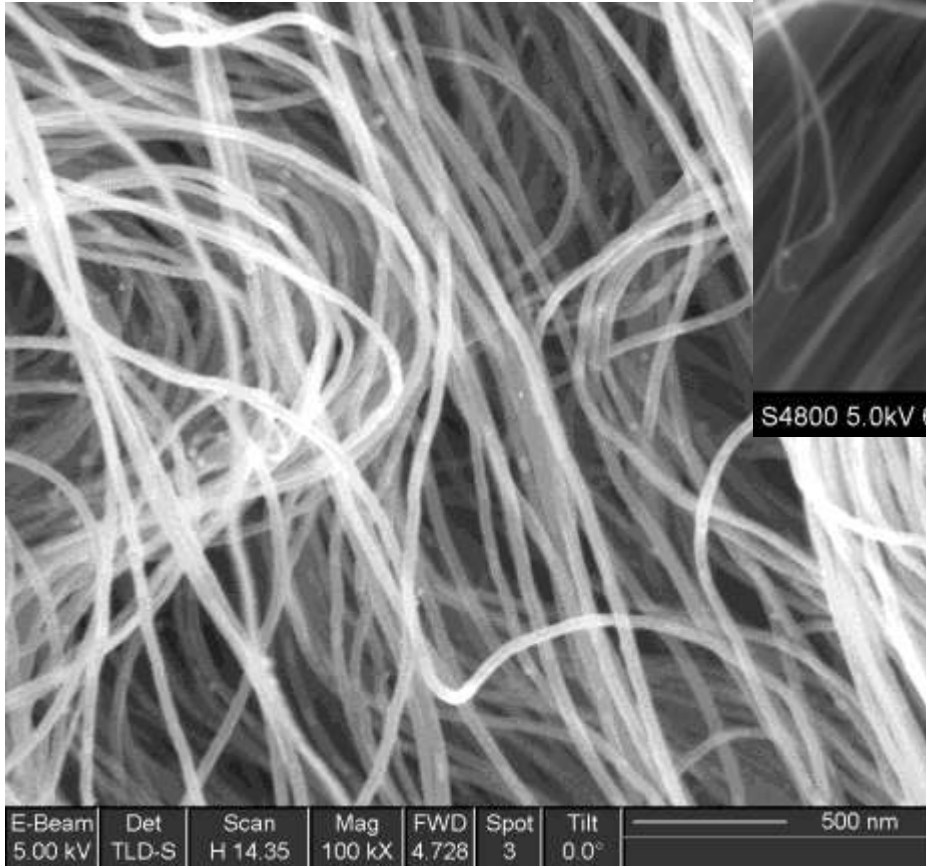




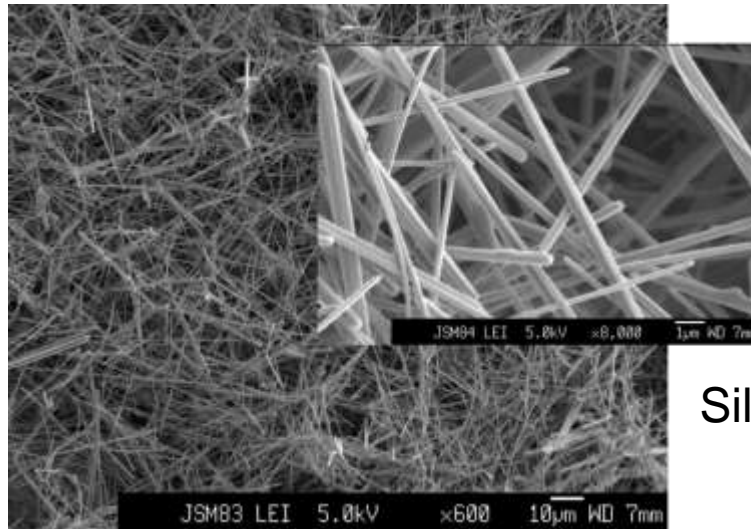


# Custom Nanomaterials

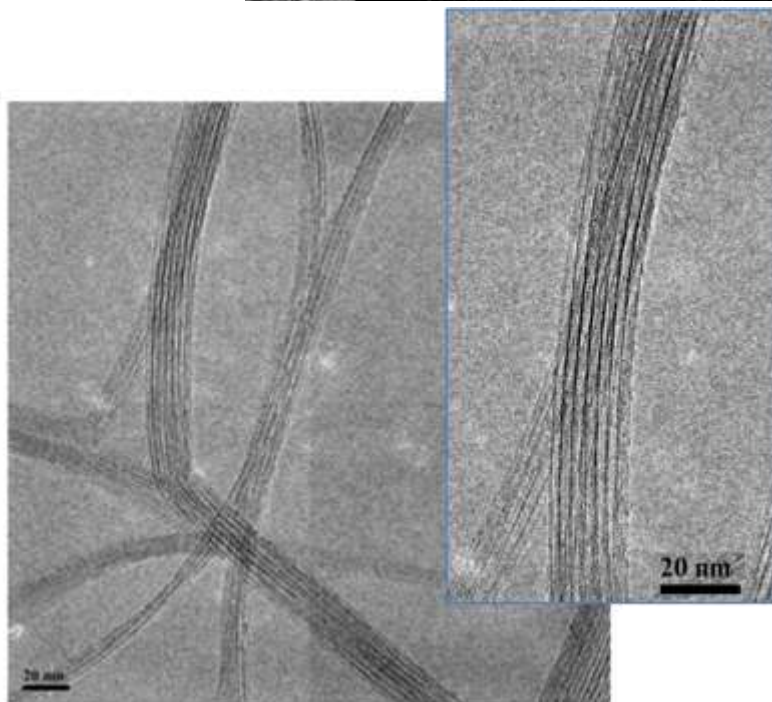
NTL grows high conductivity multi-walled carbon nanotubes (MWNT) and other custom nanomaterials at its headquarters in NC



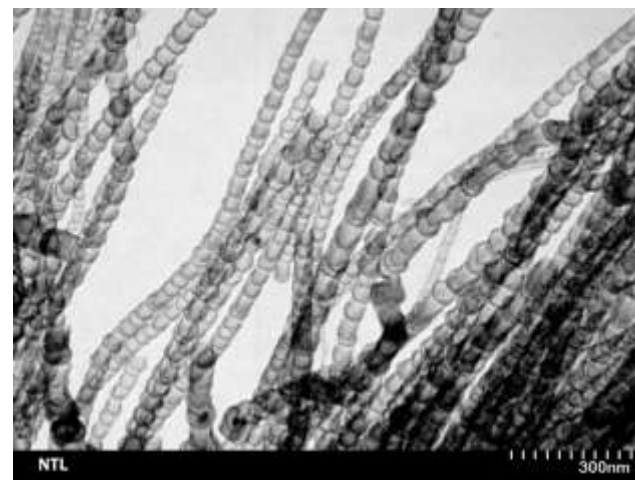
- MWNTs 10-30 nm in diameter and 5 $\mu$ m to 5mm long depending on the application
- DWNTs with a narrow diameter distribution ( $\sim 2.7$ nm)
- Silver and Gold nanowires
- Boron Nitride nanotubes



Silver nanowires



Double wall cnts



N-doped cnts



# Thank You

Thomas Tiano

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Questions?